

2 | WATER SYSTEM DESCRIPTION

INTRODUCTION

This chapter describes the City of Kent's (City) retail water service area and water service agreements, and provides a thorough description of the water system and its individual components. The results of the evaluation and analyses of the existing water system are presented in [Chapter 7](#).

WATER SERVICE AREA

HISTORY

The City was incorporated in 1890. The water system's origins date to the latter part of the nineteenth century, when a spring was tapped on the East Hill to provide water to the Kent Water and Light Company. In 1891, the City granted a 25-year franchise to the Farmers Water Company and the Kent Water and Light Company to furnish water to the City. The City retained the option to purchase the water system, which it did one year later in 1892.

In 1892, the City financed the construction of a reservoir at the top of Kennebeck Street. Further improvements were made to the water system in 1910. In 1926, the City purchased the Kent Springs water source and began construction of the original Kent Springs Transmission Main 4 years later. In the 1930s, development of the Clark Springs source began and the Guiberson Reservoir was constructed.

In the 1950s, Pump Station #3 and Pump Station #4 were constructed to pump water to the Cambridge Tank and the Reith Road Standpipe on the West Hill to provide service to this area. The 125K Tank was also added near 98th Avenue South and South 239th Place. The City adopted its first Water System Plan (WSP) in 1955.

The 1960s saw the construction of the 6 Million Gallon (MG) #1 Reservoir, 6 MG #2 Reservoir, and Blue Boy Standpipe, as well as the completion of the transmission main from Clark Springs, which provided the City with redundant spring water sources and transmission mains.

In the 1970s, the 3.5 million-gallon (MG) Tank and Pump Station #5 were constructed. The East Hill Well was developed, the City of Renton (Renton) and City of Tukwila (Tukwila) interties were constructed, and the South 212th Street and South 208th Street wells were drilled. Chlorination was also added to Kent Springs.

In the 1980s, Pump Station #6 and Pump Station #7 were constructed to improve the level of service on the West Hill. Pump Station #8 also was constructed to provide an intertie with the Highline Water District (HWD). The Garrison Creek Well, Armstrong Springs Wells, and Seven Oaks Well also were developed to provide additional supply. Fluoridation was added to Clark Springs. The City became a member of the South King County Critical Water Supply Service Area (SKCCWSSA) to coordinate water planning efforts and began the process of obtaining additional supply from the City of Tacoma (Tacoma).

In the 1990s, the South 212th Street Iron and Manganese Treatment Facility was completed, and the City's first Water Conservation Plan was adopted. As a member of the SKCCWSSA, the

City participated in the development and adoption of the *South King County Coordinated Water System Plan* (CWSP). In addition, major transmission and distribution pipeline improvements were completed, and the Infrastructure Maintenance Management and Inventory System was brought online to assist with planned maintenance. Lead and Copper Rule treatment and siting studies were accomplished in accordance with Safe Drinking Water Act (SDWA) requirements, and seismic evaluations and upgrades were completed on the City's reservoirs and other distribution system infrastructure.

In the 2000s, the Tacoma Regional Water Supply System (RWSS) became the City's third primary water source. The City partnered with Tacoma, Covington Water District (CWD), and Lakehaven Water and Sewer District (LWSD) on this project and in doing so, added 12.64 million gallons per day (MGD) to the City's available supply. Seismic, security, and redundancy upgrades were also made to many of the City's facilities.

In the 2010s, the 640 Tank and additional upgrades were constructed in preparation for the creation of the new 640 Pressure Zone. The Guiberson Corrosion Control Facility was constructed, and additional seismic, security, and redundancy upgrades also have been constructed throughout the system.

RETAIL WATER SERVICE AREA

The City's retail water service area, which covers an area of approximately 23.7 square miles, is shown on **Figure 2-1**. The existing service area is predominantly contained within the City's incorporated boundaries, but also includes areas of the City of Auburn (Auburn), and unincorporated King County. The existing service area is approximately bordered by Interstate 5 (I-5) to the west, SE 304th Street to the south, S 180th Street to the north, and 128th Avenue SE to the east. Along the north-south axis of the system, the retail water service area is approximately 7.6 miles long. Along the east-west axis, the existing retail water service area is approximately 5.7 miles wide. The City will provide water service throughout the existing retail water service area in accordance with the Municipal Water Law's duty to provide service requirements. The existing retail water service area defines the place of use for each water right held by the City for municipal water supply purposes. The place of use can be updated through subsequent water system planning or engineering document submittals that are approved by the Washington State Department of Health (DOH).

Along with the existing retail water service area, Kent's city limits, neighboring city limits, the King County urban growth area (UGA) boundary, and Kent's Potential Annexation Areas (PAAs) are shown in **Figure 2-1**.

TOPOGRAPHY

The topography of the existing service area is lowest in the valley (20 feet) at the center of the city that runs north and south (Green River Valley), with the highest elevations on the east and west hillsides of the City, respectively called East Hill and West Hill. The highest existing service elevations are located on East Hill, at approximately 500 feet. The majority of the existing system is located within the Green River watershed.

GEOLOGY¹

The City is located in the southeastern part of the Puget Sound Lowland, which is a topographically low region between the Olympic Mountains and the Cascade Range. This area has been subjected to repeat episodes of advancing and retreating continental glaciation, as well as the deposition of sediment from rivers and streams flowing from the Cascade Range during periods when the continental glaciers were not present. The City's service area includes topographic uplands to the east (Covington Upland) and west (Des Moines Upland) flanking a wide, flat-bottomed north-south trending valley (Green River Valley). Downtown Kent is located on the eastern edge of the Green River Valley.

Bedrock, consisting primarily of sedimentary rock such as sandstone, siltstone, shale, and coal, is found below an elevation of approximately 400 feet below sea level beneath Downtown Kent. Bedrock crops out, or is found closer to ground surface, farther to the north and east of the City.

Above the bedrock are unconsolidated sediments that have been deposited during glacial and non-glacial periods over the past several hundred thousand years. Glacial sequences typically consist of advance outwash (sand), glacial till (unsorted mixture of silt, sand, and gravel), and recessional outwash (sand and gravel). Non-glacial sequences are typically alluvial (layered silt, sand, and gravel) and lacustrine (clay and silt) in nature. The glacial sequences that have been named in this area include the Double Bluffs Glaciation (greater than 100,000 years old), the Possession Glaciation (80,000 to 60,000 years old), and the Vashon Glaciation (23,000 to 10,000 years old). The non-glacial deposits include the Whidbey Interglaciation (100,000 to 80,000 years old), the Olympia Interglaciation (60,000 to 23,000 years old), and the Holocene age sediments (10,000 years old to present).

The upland areas (Des Moines Upland and Covington Upland) are glaciated drift plains that were shaped by the Vashon Glaciation. The most prevalent geologic unit at the ground surface on the drift plains are Vashon Glacial Till, which was laid down beneath the most recent continental glacier. The glaciated drift plains contain oblong north-south orientated hills and depressions created by the advance and retreat of the Vashon continental glacier over the area. In various locations the recessional outwash was deposited preferentially in the depressions; in other areas the recessional outwash streams incised into the glacial till and formed thicker recessional outwash channels.

The alluvial deposits on the uplands are typically very thin, whereas the alluvial deposits beneath the Green River Valley can be hundreds of feet thick.

All sediments older than the Vashon recessional outwash have been overridden by a glacier and compacted. This compaction means that those sediments more easily support foundations. Liquefaction susceptibility of these sediments, as presented by the Washington State Department of Natural Resources, range from very low to moderate. The Vashon recessional outwash deposits have low liquefaction susceptibility. The recent alluvium deposits can be loose and, where saturated, can be susceptible to liquefaction, which has implications for infrastructure. All alluvial deposits in the Green River Valley have medium to high liquefaction susceptibility.

Groundwater recharge to the City's sources primarily originates as precipitation. Groundwater flows both laterally (east to west) and vertically downward under the uplands, which are the

¹ Reference: Woodward, D.G., Packard, F.A., Dion, N.P., and Sumioka, S.S. 1995. *Occurrence and Quality of Ground Water in Southwestern King County, Washington*. U.S. Geological Survey. Water-Resources Investigations Report 92-4098.

recharge areas. Groundwater flow beneath the Green River Valley is generally downstream (north) and vertically upward since this is a regional discharge area.

The City's spring sources are primarily situated at locations where the Vashon recessional outwash aquifer, or older adjacent aquifers, are pinched or constricted, which forces the water to discharge from the aquifer.

INVENTORY OF EXISTING WATER FACILITIES

This section provides a detailed description of the existing water system and the current operation of the facilities. The analysis of the existing water facilities is presented in [Chapter 7](#). Additional information on the City's existing water system facilities is included on DOH Water Facilities Inventory (WFI) form in [Appendix A](#).

PRESSURE ZONES

The City serves customers within an elevation range from 20 feet above sea level in the valley running north and south through the middle of the system to approximately 500 feet above sea level on the east side of the system, also referred to as East Hill. This wide elevation range requires that the water pressure be increased or reduced to maintain pressures that are safe and sufficient to meet the flow requirements of the system. The City achieves this by dividing the water system into 13 different pressure zones, as shown in [Figure 2-1](#). The pressure in each zone is regulated by reservoir levels, pressure reducing station settings and other control valve settings, pump settings, or a combination of these, as illustrated in the hydraulic profile ([Figure 2-2](#)).

Central Valley

240 Pressure Zone

The 240 Zone is the largest pressure zone in the City, serving the lowest elevations in the valley between the East Hill and West Hill. The Kent Springs Transmission Main (KSTM) terminates at the 240 Zone's Guiberson Reservoir, and can provide water to the zone from Kent Springs, the Armstrong Springs Wells, the Seven Oaks Well, and Tacoma. The zone also can be supplied directly with water from the O'Brien Well, the 208th Street/212th Street Wellfield, and the Garrison Creek Well. Pressures in the 240 Zone are established by the 6 MG #2 Reservoir and the Guiberson Reservoir. This zone currently serves customers within an elevation range between approximately 20 feet and 135 feet. There also are interties with Tacoma, Tukwila, Auburn, and Renton connected to the 240 Zone.

East Hill

271 Alvord Pressure Zone

The 271 Alvord Zone is supplied by one pressure reducing station from the 485 Zone that establishes pressures in the zone. This pressure zone currently serves customers within an elevation range between approximately 60 feet and 170 feet, and is located near the base of the East Hill, just north of Mill Creek, primarily between Alvord Avenue N and Hazel Avenue.

308 Hilltop Pressure Zone

The 308 Hilltop Zone is a very small zone supplied by one pressure reducing station from the 485 Zone that establishes pressures in the zone. This pressure zone currently serves customers within an elevation range of 120 feet and 130 feet. This pressure zone also is located near the base of the East Hill and only provides water to customers along 91st Avenue South.

339 Seattle Pressure Zone

Water is supplied to the 339 Seattle Zone by one pressure reducing station from the 485 Zone that establishes pressures within the zone. The 339 Seattle Zone is located on a small plateau near the base of East Hill, predominantly between Van De Vanter Avenue to the east and Scenic Way to the west. The zone currently serves customers within an elevation range between approximately 70 feet and 270 feet.

366 Stetson Pressure Zone

The 366 Stetson Zone is a small pressure zone located on the East Hill; this zone is supplied water by one pressure reducing station from the 485 Zone. The 366 Stetson Zone serves customers on the following four streets: Hazel Avenue N; Valley Place; Stetson Avenue; and Crest Place. This zone currently serves customers within an elevation range between approximately 170 feet and 230 feet.

368 Weiland Pressure Zone

Water is supplied to the 368 Weiland Zone by one pressure reducing station from the 485 Zone that establishes pressure in this zone. This zone currently serves customers within an elevation range between approximately 110 feet and 210 feet, and is located just north of Mill Creek along Canyon Drive and Weiland Street.

416 Pressure Zone

The 416 Zone is a very small zone that consists predominantly of the transmission main from the 416 Zone 6 MG #1 Reservoir to the 240 Zone 6 MG #2 Reservoir. The transmission main follows 98th Avenue S northwards from the 6 MG #1 Reservoir before crossing through several neighborhoods to the northwest until the main intersects S 218th Street, where it heads east to fill the 6 MG #2 Reservoir. There are a limited number of customers connected to the transmission main, and the City plans to transfer these customers to other pressure zones in the future. Elevations in this pressure zone range from approximately 80 feet to 380 feet. The Clark Springs Transmission Main (CSTM) terminates at the 6 MG #1 Reservoir, supplying water from Clark Springs, the Armstrong Springs Wells, and the Seven Oaks Well.

485 Pressure Zone

The 485 Zone is supplied with water from Pump Station #5 and three pressure reducing stations connected to the 590 Zone. Pressures in this zone are established by the 125K Tank. This zone currently serves customers within an elevation range between approximately 150 feet and 400 feet, and is located between S 218th Street at its northern extent, and East Maple Street to its southern extent.

590 Pressure Zone

The 590 Zone is the system's second largest pressure zone and serves the eastern portions of the water system. This zone is supplied water by a direct connection to the Tacoma RWSS at Point of Delivery (POD) #3, the East Hill Well, and Pump Station #5. Pressure is established by the Blue Boy Standpipe, the 3.5 MG Tank, and the 640 Tank. The 640 Tank was constructed to provide storage for a future 640 Pressure Zone but is operated in the 590 Zone until all necessary facilities are constructed for establishment of the 640 Zone. Customers in the 590 Zone are located in an elevation range between approximately 290 feet and 500 feet. The 590 Zone serves customers between SE 225th Place and SE 304th Street.

West Hill

354.5 Pressure Zone

The 354.5 Zone, the lowest West Hill pressure zone, is supplied water by Pump Station #3. A pressure reducing valve (PRV) at Pump Station #4 also allows the zone to be supplied from the higher elevation zones on the West Hill in a maintenance or emergency situation. The pressure in the 354.5 Zone is established by the Reith Road Standpipe. This zone currently serves customers within an elevation range between approximately 90 feet and 280 feet and is located primarily between Reith Road and Lake Fenwick Road.

529 Pressure Zone

Water is supplied to the 529 Zone by Pump Station #4. In an emergency situation, water can be supplied from the 587 Zone through the 42nd Avenue South PRV. Pressure in the zone is established by the Cambridge Tank, located in the southwest corner of the zone. The 529 Zone serves customers within an elevation range between approximately 280 feet and 430 feet and is located in the southwest corner of the system between Military Road South and Lake Fenwick Road South.

575 Pressure Zone

The 575 Zone is a small, closed pressure zone that is supplied water from Pump Station #7, which establishes the pressure in this zone. During a fire flow event exceeding the capacity of Pump Station #7, the pump station will shut off and the zone will be supplied through a check valve from the Cambridge Tank, which has an overflow elevation of 529 feet. The check valve is located at Pump Station #7. The 575 Zone is also located in the southwest corner of the City's system between S 268th Street and S 263rd Street. This zone currently serves customers within an elevation range between approximately 410 feet and 450 feet.

587 Pressure Zone

The 587 Zone is a closed pressure zone supplied water by Pump Station #6, which establishes the pressure in the zone. Like the 575 Zone, during a fire flow event exceeding the capacity of Pump Station #6, the pump station will shut off and the zone will be supplied from the Cambridge Tank, which has an overflow elevation of 529 feet, via two check valves. One check valve is located at the Pump Station #6 site, and the second is located near the intersection of Military Road South and S 259th Place. Pump Station #8 is also connected to the 587 Pressure Zone. This pump station provides water from the HWD intertie, which is available for emergency supply, fire flow, and maintenance purposes. Pump Station #8 provides the only

redundant supply to the West Hill pressure zones, which is otherwise supplied only by Pump Station #3. The 587 Zone is located in the southwest corner of the City's system, between S Reith Road and S 239th Place. This zone provides water to customers located at an elevation between approximately 330 feet and 450 feet.

SUPPLY FACILITIES

Introduction

Water in the City's system is supplied predominantly from Kent Springs, Clark Springs, and the Tacoma Second Supply Pipeline. The City utilizes its wells periodically to ensure that all sources are regularly exercised, but does not typically operate these sources due to their higher cost of operation compared to Kent Springs, Clark Springs, and the Tacoma intertie.

A summary of the City's sources of supply is shown in [Table 2-1](#). Additional information on the City's sources of supply, water treatment, and water quality monitoring is contained in [Chapter 6](#).

Table 2-1
Supply Facilities Summary

Facility	Type	Supplies Water To	Year Installed	Use	Existing Capacity (gpm)	Water Treatment	Generator
208th Street/ 212th Street Wellfield	4 wells	240 Zone	1982, 2001	Active	3,500	Chlorination, Fluoridation, Manganese/Iron/Hydrogen Sulfide Removal, pH Adjustment	208th: None 212th: Hookup for portable generator
Armstrong Springs Wells	2 wells	CSTM/ KSTM	1982	Active	1,050	Chlorination, Fluoridation, pH Adjustment	On-site
Clark Springs	Infiltration gallery and collector, 3 wells	CSTM	1957, 1969	Active	5,400	Chlorination, Fluoridation, pH Adjustment	On-site generator partially powers facility
East Hill Well	1 well	590 Zone	1979	Active	1,900	Chlorination, Fluoridation, pH Adjustment	On-site
Garrison Creek Well	1 well	240 Zone	1981	Active	500	Chlorination, Fluoridation	On-site generator for SCADA system only
Kent Springs	Infiltration gallery, 3 wells	KSTM	1908, 1977, 2001	Active	3,680	Chlorination, Fluoridation, pH Adjustment	On-site generator
O'Brien Well	1 well	240 Zone	1951	Active	243	Chlorination, Fluoridation	None on-site, towed generator is used
Seven Oaks Well	1 well	CSTM/ KSTM	1982	Active	350	Chlorination, Fluoridation, pH Adjustment	None
Tacoma RWWS	Intertie	KSTM/ 590 Zone	2005	Active	8,778	Chlorination, Fluoridation, Filtration, Ozone Treatment, pH Adjustment ¹	Site has full backup power

¹ = pH adjustment occurs in Tacoma system and when RWSS water is directed through the KSTM to the Guiberson Reservoir.

Water Treatment

All City water sources are chlorinated and fluoridated. In 2015, the Tacoma Green River filtration facility was completed, allowing for less-constrained use of the Tacoma supply. Aeration and sodium hydroxide pH adjustment are used at the Guiberson Reservoir site to treat blended Kent Springs and Tacoma water. The City also uses pH adjustment at the 212th Street Treatment Plant, Pump Station #5, and the East Hill Well.

212th Street Treatment Plant

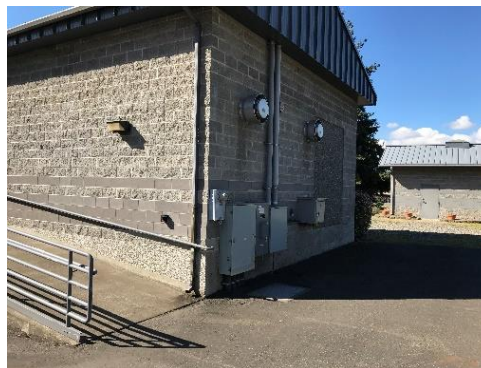
The 212th Street Treatment Plant is located at 9001 S 212th Street and was put into service in 1993. The 212th Treatment Plant treats the water from the 208th Street/212th Street Wellfield. Like all of the City's well and spring sources, the water goes through a chlorination and fluoridation process. Pressure filters use potassium permanganate and greensand technology to remove iron, manganese, and hydrogen sulfide at this plant. The plant also introduces a pH adjustment with the addition of sodium hydroxide to reduce the corrosivity of the finished water on household plumbing and maintain compliance with the Lead and Copper Rule.

In 2008, the treatment plant received new programmable logic controller (PLC) upgrades. In 2016, a mag meter upgrade took place and a new auma valve control actuator was installed.

Water Supply

208th Street/212th Street Wellfield

The 208th Street/212th Street Wellfield consists of four wells – three on the 212th Street Treatment Plant site and one behind WinCo foods on S 208th Street – that supply water to the 240 Zone. The first wells were constructed in 1982, the treatment plant was brought online in 1993, and an additional well was constructed on the treatment plant site in 2001 to address a drought and declining capacity in Wells #1 and 2. The total capacity of the wellfield is approximately 3,500 gallons per minute (gpm). Interference between the three 212th Street Wells can sometimes affect the total capacity. In 2015, the 212th Street Well #3 received a motor replacement.



212th Street Treatment Plant Building

Because the 212th Street Treatment Plant is relatively expensive to operate compared to the City's spring sources and the Tacoma supply, the wellfield is typically only operated for around 2 weeks annually for exercise and operator familiarization.

Armstrong Springs Wells

The Armstrong Springs Wells are a wellfield located south of SE 272nd Street, immediately next to Jenkins and Cranmar Creek, south of Covington. The immediate surrounding area has been annexed into the City. The two wells were installed in 1982 and are approximately 80 to 90 feet deep. Permanent treatment facilities, which provide chlorination and fluoridation, were installed in 2002, and the chlorination equipment was upgraded in 2013. The wells are capable of producing approximately 1,050 gpm and can pump to either the CSTM or KSTM. Facilities at the termination points of the CSTM and KSTM provide pH adjustment. In 2016, a back-up power generator with motor control center (MCC) upgrades was installed, and the City made a

property purchase for the purpose of source protection. The property purchase consisted of 10 acres to the north of the wells, between the wells and Highway 516. The City has demolished all buildings on the property.

Clark Springs

The Clark Springs source is the easternmost City-owned source, located south of SE Kent-Kangley Road, east of Maple Valley, adjacent to Rock Creek. Like Kent Springs, the approximately 320 acres of property surrounding the Clark Springs source has been annexed to the City for municipal supply purposes. The Clark Springs water source consists of an infiltration gallery and collector, and three wells that supply water to the system via the CSTM. The water is treated with chlorine and fluoridation at the source, and is also treated at a pH adjustment facility located at the Pump Station #5 site. The total capacity of the source is approximately 5,400 gpm.

Constructed in 1957, the Clark Springs infiltration gallery and collector consists of a gallery of several hundred feet of 16-inch perforated steel pipe, lying horizontally 15 to 20 feet below ground surface and extending under Rock Creek. Water is collected in the gallery from a wide area and diverted to a chamber at the beginning of the CSTM. A valved section of 12-inch pipe extending beneath the Rock Creek channel to the southern side also is connected to the gallery. Like the Kent Springs source, the Clark Springs source experiences reduced capacity in the summer months as the aquifer levels decline.

The three Clark Springs wells, which are approximately 50 to 80 feet deep, were constructed in 1969 and rehabilitated in 1985 due to corrosion-related capacity reduction. Maintenance and rehabilitation of the pumps occurred in 2002. The area is subject to electrolysis problems that limit the remaining useful life of the wellfield. In 2008, a security fence was added around the infiltration gallery. Levee improvements were constructed to protect the infiltration gallery in 2008 and 2012. In 2009, the clearwell variable frequency drive (VFD) was replaced, and in 2010 the Well #2 pump received a VFD upgrade. Security improvements to the clearwell and a hood installation were completed in 2011, and a surge tank electrical upgrade was completed in 2012. In 2015, the Well #1 MCC was replaced.

Due to the close proximity of the Clark Springs sources to the Landsburg Mine site, over many years the City has advised the Washington State Department of Ecology (Ecology) of the City's serious concerns about the site and the efforts overseen by Ecology to address the site's environmental conditions. In recent years, the City submitted to Ecology comments in opposition to Ecology's cleanup action plan for the site, seeking further investigation/action at the site, and a cleanup action plan more protective of area groundwater, including the Clark Springs source aquifers. The City also has implemented various activities to increase monitoring and sampling at and near Clark Springs.

The Rock Creek Habitat Conservation Plan was completed in 2011.

East Hill Well

The East Hill Well was originally constructed in 1979. The well provides water directly to the 590 Zone and is located on 104th Avenue SE between SE 244th Street and SE 248th Street. The well pump and motor were replaced in 2000; a pH adjustment treatment facility was installed in 2003; and the well received new chlorination equipment in 2007. The source is also fluoridated. An on-site engine generator set for back-up power was installed in 2013. The well was redeveloped in 2017, and a new pump and motor were installed. The East Hill Well is capable of providing approximately 1,900 gpm to the system.



East Hill Well

Garrison Creek Well

Located at Garrison Creek Park on the same site as the 6 MG #2 Reservoir, the Garrison Creek Well supplies water directly to the 240 Pressure Zone. The original Garrison Creek Well, installed in 1981, lost capacity as a result of the 2001 Nisqually earthquake. The well was re-drilled in 2004.

Water from the Garrison Creek Well is typically pumped directly into the 6 MG #2 Reservoir but can be pumped to the distribution system. The water is chlorinated and fluoridated. The well is capable of providing approximately 500 gpm to the system.



Garrison Creek Well

Kent Springs

The Kent Springs source was originally constructed in 1908 and has been providing water to the City for over 100 years. The source is located near Black Diamond just north of Lake Sawyer, several miles east of the distribution system, in an area of approximately 75 acres that has been annexed into the City for municipal supply purposes. The source consists of a spring-fed infiltration gallery and a wellfield, both of which can provide water to the KSTM. The water from this source is treated with a chlorination and fluoridation process before being supplied to the City. New chlorination equipment was installed in 2015. Additionally, pH adjustment takes place at the Guiberson Reservoir site. The total capacity of the source is approximately 3,680 gpm.

Located at the base of a hillside where the springs discharge, the Kent Springs infiltration gallery was constructed in 1908, and remains in good condition. The gallery is constructed of several hundred feet of perforated concrete pipe buried up to 10 to 15 feet deep. During the warmer months, the capacity of the infiltration gallery drops, and the wellfield is utilized. In 2015, a gallery level sensor was installed.

The Kent Springs wellfield consists of three wells. Well #1 and #2 were drilled in 1977, and Well #3 was drilled during drought conditions in 2001. The wells are drilled to approximately 70 to 105 feet deep and experience a reduced capacity during the summer due to lower aquifer levels, which are speculated to be caused by increasing withdrawals from exempt wells in the area. This reduced capacity limits the ability of Kent Springs to respond to peak demand events during the summer. The wellfield is also subjected to significant corrosion problems, caused by the nearby Bonneville Power Administration power lines. In 2008, security fencing was added

around Wells #1, #2, and #3. Kent Springs currently has a small generator which cannot power the entire facility; a larger-capacity generator is anticipated to be installed in the near future.

O'Brien Well

The O'Brien Well was originally constructed in 1951 and re-drilled in 1999. The well is located in the 240 Zone, approximately ½ mile south of the 212th Street Treatment Plant. The O'Brien Well is an artesian well, and equipped with pumping equipment to deliver up to 243 gpm to the 240 Zone. The water produced from the well is chlorinated and fluoridated. Typically, the well is only operated during periods of peak demands to supplement the primary sources. However, the well has been experiencing water quality issues and is run only occasionally to exercise the source. No back-up power is available on site.



O'Brien Well

Seven Oaks Wells

The Seven Oaks Well was drilled in 1982 and is located near the intersection of 116th Avenue SE and SE Kent-Kangley Road. The water is treated with a chlorination and fluoridation process before it is sent into the City's distribution system. Water from the Seven Oaks Well can be pumped to either the CSTM or KSTM. Facilities at the termination points of these transmission mains provide pH adjustment. The well is capable of producing approximately 350 gpm but is run only occasionally to exercise the source.



Seven Oaks Well

Tacoma RWSS

In 1985, the City entered into an agreement wherein the City would share in the capital costs and operational and maintenance costs of what was previously referred to as the City of Tacoma's Green River Pipe Line No. 5 (also previously referred to as the Second Supply Pipeline or SSP), including portions of the water right and surface water storage behind the Howard Hansen Dam. Several other purveyors also participated in the project. The City's portion of the available capacity is 12.64 MGD, or approximately 8,778 gpm.

In 2005, the 34-mile-long pipeline began conveying water. Turbidity in the Green River has historically constrained use of the Tacoma supply to the months of June through September, resulting in the construction of the Green River filtration facility. With the completion of this facility in 2015, the Tacoma supply can now be utilized year-round. The City is required to accept a consistent flow rate from Tacoma, with a 1-week warning required to change this flow rate. Other City sources provide modulation in response to actual demands.

There are three City connections to the RWSS. The first, POD #1, is located at Kent Springs and supplies water to the KSTM. The second, POD #2, located near the intersection of 124th Avenue SE and SE 296th Street, has been left undeveloped. POD #2 currently consists of a manhole over the transmission main, which contains a tee with a blind flange. The third, POD #3, is located

near the 3.5 MG Tank, and can supply water to either the KSTM or the 590 Pressure Zone. In the future, POD #3 will provide water to the 640 Pressure Zone without the need for a booster pump station.

Water is filtered at the Green River filtration facility, chlorinated, fluoridated, adjusted for pH, and undergoes ozone treatment before it reaches the City. If RWSS water is directed to the KSTM, the water also undergoes a pH adjustment before entering the distribution system at the Guiberson Reservoir.

PUMP STATION FACILITIES

The City's water system has six booster pump station facilities that provide supply to the 354.5 Zone, 485 Zone, 529 Zone, 575 Zone, 587 Zone, and 590 Zone. A summary of the pumping facilities is shown in [Table 2-2](#), and a detailed description of each facility is provided below.

Table 2-2
Booster Pump Station Facilities Summary

Pump Station	Suction Pressure Zone	Discharge Pressure Zone	Year Constructed	Existing Pumping Capacity (gpm)	Number of Pumps	Pump Type	Pump Motor Size (HP)	Generator
Pump Station #3	240 Zone	354.5 Zone	1959	1,800	2	Horizontal split case	(2) 50	On-site
Pump Station #4	354.5 Zone	529 Zone	1959	3,800	3	Horizontal split case	(2) 75 (1) 150	On-site
Pump Station #5	416 Zone	485 and 590 Zones	1975	6,350	4	Horizontal split case	(2) 125, (1) 40, (1) 40/125	On-site
Pump Station #6	529 Zone	587 Zone	1984	1,200	3	Vertical turbine	(3) 20	Has hookup for portable generator
Pump Station #7	529 Zone	575 Zone	1985	500	2	Horizontal	(2) 10	On-site
Pump Station #8	Highline Water District 560 Zone	587 Zone	1986	1,200	3	Vertical turbine	(3) 20	Has hookup for portable generator

Pump Station #3

Originally constructed in 1959, and upgraded in 1979 to increase capacity, Pump Station #3 is located at the intersection of Reith Road and Lake Fenwick Road. Pump Station #3 has two 900 gpm pumps that supply water from the 240 Zone to the 354.5 Zone. Besides the emergency intertie with HWD, Pump Station #3 is the only pump station supplying water to the City's West Hill pressure zones.

Typically, only one of the two pumps are operated at a time. The pump station has an on-site engine generator set for back-up power supply. Upgrades of the automatic transfer switch and motor control center, as well as the installation of either soft starts or VFDs are planned for 2018.



Pump Station #3

Pump Station #4

Like Pump Station #3, Pump Station #4 was originally constructed in 1959. It has received upgrades in 1979, 1983, and 1997 to improve pumping capacity and reliability. Pump Station #4 has two 900 gpm pumps and one 2,000 gpm pump that supply water from the 354.5 Zone to the 529 Zone.

This station is located on the same site as the Reith Road Standpipe. If the standpipe and Pump Station #3 are taken offline for maintenance or an emergency situation, a PRV on site can supply water to the 354.5 Zone from the HWD intertie via the 529 Zone. Pump Station #4 currently has a back-up diesel engine that can directly drive the 2,000 gpm pump if electrical power is lost. The City plans to add a new engine generator set on site because it is difficult to find replacement parts for the aging diesel engine.



Pump Station #4

Pump Station #5

Located on the same site as the 6 MG #1 Reservoir and the 125K Tank, Pump Station #5 was constructed in 1975. The pump station has two 1,225 gpm pumps that supply water from the 416 Zone to the 485 Zone, and two dual-speed 1,950 gpm pumps that supply water from the 416 Zone to the 590 Zone. One of the 1,225 gpm pumps (Pump 2) is a dual speed pump that is also capable of supplying the 590 Zone. Two of these four pumps are used to supply water to the 485 Zone and the other two are used to provide water to the 590 Zone, alternating monthly which pumps are running. Back-up power is provided by an engine generator set inside the building. Control valve auma



Pump Station #5

replacements were installed in 2012. In 2015, an MCC upgrade took place, with soft starts for pumps 3 and 4. In 2016, the control vault for the 125K Tank was upgraded.

The Pump Station #5 building also contains a pH adjustment facility, which provides corrosion control for water supplied to the system through the CSTM. A PRV located inside the pump station also allows water to be supplied from the 590 Zone to the 416 Zone, and from here to the 240 Zone via the 6 MG #1 Reservoir to 6 MG #2 Reservoir Transmission Main. This provides a means for Tacoma water to be supplied to the 240 Zone and West Hill if the KSTM and CSTM are offline.

Pump Station #6

Originally constructed in 1984, Pump Station #6 is located in an underground vault near the intersection of South Reith Road and 38th Avenue South. Using three vertical turbine pumps, the booster pump station supplies water from the 529 Zone to the closed 587 Zone. One pump is typically running; the pumps alternate every 8 hours. If demands in the 587 Zone exceed approximately 1,220 gpm for 2 minutes, the pumps are automatically turned off and flow is provided by gravity through two check valves from the 529 Zone.

All of the pump motors are equipped with VFDs. Pump Station #6 is not equipped with on-site back-up power, but an emergency generator transfer switch was installed in 2011.



Pump Station #6

Pump Station #7

Pump Station #7 was built in 1985 and is located in an underground vault on the same site as the Cambridge Reservoir, just south of S 264th Street. This pump station is equipped with two pumps that supply water from the 529 Zone to the 575 Zone. Pump 1 (the station's small pump) was taken offline in 2009. If demands in the 575 Zone exceed approximately 450 gpm for 3 minutes, the pumps are automatically turned off and flow is provided by gravity through a check valve from the 529 Zone. Control modifications to include VFDs took place in 2009, and a new mag meter was installed in 2012. An on-site engine generator set was installed in 2012 to provide back-up power.



Pump Station #7

Pump Station #8

Pump Station #8 is an underground pump station that was built in 1986. It is located just east of I-5 on S 240th Street. The pump station is used in emergency situations to provide water from HWD to the 587 Zone and other West Hill zones. The pump station contains three identical 400 gpm vertical turbine pumps equipped with VFDs. The VFDs were replaced in 2008.



Pump Station #8

STORAGE FACILITIES

The City's water system has nine storage facilities that provide storage to various zones in the system. A summary of the storage facilities is shown in [Table 2-3](#), and a detailed description of each facility is provided in the following sections.

Table 2-3
Storage Facilities Summary

Reservoir	Approximate Location	Pressure Zone	Year Constructed	Construction Type	Capacity (MG)	Diameter (feet)	Base Elev. (feet)	Overflow Elev. (feet)
6 Million Gallon #2 Reservoir	Garrison Creek Park	240 Zone	1969	Reinforced concrete below grade	6	Variable	212	240
Guiberson Reservoir	E Guiberson St and Kensington Ave S	240 Zone	Late 1930s	Reinforced concrete below grade	3	Variable	222	240
Reith Road Standpipe	Reith Rd S, just north of W Fenwick Park	354.5 Zone	1959	Steel	1.0	66	315.0	354.5
6 Million Gallon #1 Reservoir	98th Ave S and S 239th Pl	416 Zone	1967	Steel	6.0	146	370.0	418.0
125K Tank	98th Ave S and S 239th Pl	485 Zone	1958	Elevated steel	0.125	32	462.0 ¹	485.0
Cambridge Tank	S 264th St and Military Rd S	529 Zone	1959	Elevated steel	0.3	53.33	499.1 ²	529.0
3.5 MG Tank	124th Ave SE and SE 286th Pl	590 Zone	1978	Steel	3.5	74	483.4	592.9
640 Tank	SE 248th St and 124th Ave SE	590 Zone (Future: 640 Zone)	2011	Steel	4.0	75	523.0	595.0 (Future: 645.0)
Blue Boy Standpipe	112th Ave SE and SE 246th Pl	590 Zone	1965	Steel	0.97	42	499.7	593.8

1 = Ground elevation 386.8 feet.

2 = Ground elevation 441 feet.

240 Zone

6 MG #2 Reservoir

The 6 MG #2 Reservoir, also referred to as the Garrison Creek Reservoir, is a 6.0 MG covered, underground reinforced concrete reservoir located in Garrison Creek Park. Sports courts are located atop its roof slab. The reservoir was constructed in 1969 and provides storage for the 240 Zone. The reservoir has a base elevation of 211.5 feet and an overflow elevation of 240 feet. The reservoir diameter is variable. The 6 MG #1 Reservoir to 6 MG #2 Reservoir Transmission Main terminates at the reservoir.

Seismic improvements were made to the reservoir in 1999. Vent security improvements were constructed in 2008. The reservoir was last inspected and cleaned approximately 3 years ago. During that time, the overflow piping was also resealed. Hatch security improvements were constructed in 2016.



6 MG #2 Reservoir

Guiberson Reservoir

The Guiberson Reservoir, constructed in the late 1930s as part of the Works Progress Administration (WPA) program, is a 3.0 MG covered, underground reinforced concrete reservoir located near the intersection of East Guiberson Street and Kensington Avenue South. The reservoir is the termination point for the KSTM and provides storage for the 240 Zone.

The reservoir has a base elevation of 221.5 feet and an overflow elevation of 240 feet. A back-up generator was installed on site in 2009. A 12-inch-diameter bypass was installed in 2010, and a 10-inch flow control valve was installed in 2012.

Reservoir lining was installed in 2016, along with inlet manifold and security door improvements. The exterior metal walls were recently painted. To maintain compliance with the Lead and Copper Rule (LCR), pH adjustment of water from the KSTM occurs onsite both by aeration/spraying of the discharge to strip carbon dioxide, and by a sodium hydroxide pH adjustment process at the Guiberson Corrosion facility, which was installed in 2011.



Guiberson Reservoir

354.5 Zone

Reith Road Standpipe

Installed in 1959, the Reith Road Standpipe is a 1.0 MG steel tank providing storage to the 354.5 Zone. The tank is located along Reith Road South, just north of West Fenwick Park. The tank has a base elevation of 315 feet, an overflow elevation of 354.5 feet, and a diameter of 66 feet.

The tank was last recoated in 1991, and received some fall protection equipment in 1997. Interior and exterior recoating, as well as additional fall protection, have been identified as future capital improvement projects.

Following a seismic evaluation, repairs to the concrete ringwall and anchorage were completed in 2005. Access to the back of the tank is challenging due to close proximity to a steep slope; geotechnical consultants are evaluating the feasibility of constructing a retaining wall and road around the back of the tank to improve access.



Reith Road Standpipe

416 Zone

6 MG #1 Reservoir

The 6 MG #1 Reservoir is a 6.0 MG steel tank that was constructed in 1967 and is located on the same site as Pump Station #5 and the 125K Tank (approximately 98th Avenue South and S 239th Place). The reservoir is the termination point of the CSTM and the beginning point of the 6 MG #1 Reservoir to 6 MG #2 Reservoir Transmission Main. Water from the CSTM receives pH adjustment at Pump Station #5.

This reservoir is 146 feet in diameter, with a base elevation of 370 feet, and an overflow elevation of 418 feet. Following a seismic analysis, the reservoir received concrete ringwall and anchorage strap repairs in 2005; the exterior also was recoated at this time. The security fencing was upgraded in 2010.



6 MG #1 Reservoir

485 Zone

125K Tank

The 125K Tank is located near 98th Avenue South and S 239th Place, on the same site as the 6 MG #1 Reservoir and Pump Station #5, where it provides 125,000 gallons of storage for the 485 Zone. The 32-foot-diameter elevated steel reservoir was constructed in 1958. The ground elevation is approximately 387 feet, the base of the tank itself is 462 feet, and the overflow elevation is 485 feet. The tank received seismic repairs, a recoating, and some fall protection improvements in 1999. Additional seismic upgrades were added in 2008. A tank drain check valve was installed in 2012. While the interior is in good condition, the exterior will need to be stripped and recoated as a future capital improvement project.



125K Tank

529 Zone

Cambridge Tank

The elevated steel Cambridge Tank, constructed in 1959, provides approximately 300,000 gallons of storage to the 529 Zone, and provides fire flow storage to the 587 and 575 Zones, which are supplied water from the 529 Zone through check valves during fire flow conditions. The reservoir is located at approximately S 264th Street and Military Road South.

The 53.33-foot-diameter tank has a ground elevation of 441 feet, a tank base elevation of 499.1 feet, and an overflow elevation of 529 feet. Fall protection improvements were made in 1991 and 1997. Seismic improvements were completed in 2005, and tank overflow and drain improvements were completed in 2012. The tank is slated for interior/exterior recoating in the near future.



Cambridge Tank

590 Zone

3.5 MG Tank

The City's 3.5 MG Tank is located near the intersection of SE 286th Place and 124th Avenue SE, just north of Auburn Mountainview High School. The 74-foot-diameter steel tank, which provides storage for the 590 Zone, was constructed in 1978. The tank has a base elevation of 483.4 feet and an overflow elevation of 592.9 feet.

In 1999, the reservoir was cleaned and painted, and received fall protection modifications. A PAX mixer was installed in 2009. In 2012, a new supervisory control and data acquisition (SCADA) back-up power generator was installed. In 2016, a new drain vault flapper and control vault were installed, and flow meter was added, and fence security improvements were made.



3.5 MG Tank

640 Tank

The 640 Tank, completed in 2011, is the newest storage facility in the City's water system. It is located near the intersection of SE 248th Street and 124th Avenue SE. The 640 Tank is a 4.0 MG steel tank with a diameter of 75 feet, a base elevation of 523 feet, and an overflow elevation of 645 feet. The tank currently operates with a maximum level of 595 feet to provide storage for the 590 Zone, but will be used for storage in the future 640 Zone when other facilities for this zone are completed.



640 Tank

Blue Boy Standpipe

Constructed in 1965, the Blue Boy Standpipe is located at 112th Avenue SE and SE 236th Place and provides 0.97 MG of storage to the 590 Zone. This 42-foot-diameter reservoir has a base elevation of 499.7 feet and an overflow elevation of 593.8 feet. The last painting occurred in 1996, with an interior coating touch up in 2013. Fall protection was added in 1997. Seismic improvements, and overflow and drain line improvements were made to the reservoir in 2011. In 2012, piping and control vault improvements for the future 640 Zone were installed.



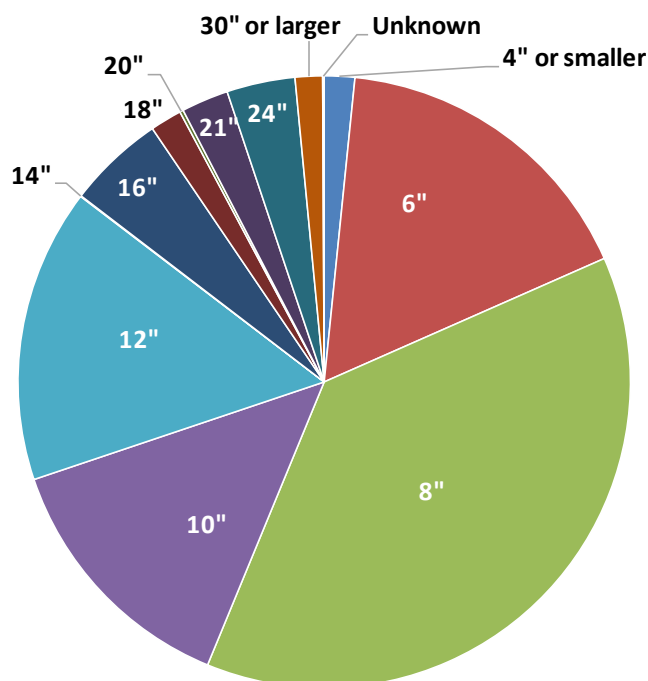
Blue Boy Standpipe

DISTRIBUTION AND TRANSMISSION SYSTEM

The City's water system contains 284 miles of water main ranging from 1 inch to 36 inches in diameter. As shown in [Table 2-4](#), most of the water main (approximately 85 percent) within the system is 12 inches in diameter or less. The remaining 15 percent of the water main is 14 inches in diameter or larger. The existing water main diameter is shown on the water system node diagram figures contained in [Appendix L](#).

Table 2-4
Water Main Diameter Inventory

Diameter (Inches)	Length (Feet)	% of Total
4 or smaller	24,139	1.6%
6	251,772	16.8%
8	567,492	37.8%
10	204,265	13.6%
12	232,958	15.5%
14	579	0.0%
16	76,769	5.1%
18	25,118	1.7%
20	2,817	0.2%
21	37,316	2.5%
24	54,154	3.6%
30 or larger	21,626	1.4%
Unknown	1,203	0.1%
Total	1,500,208	100%

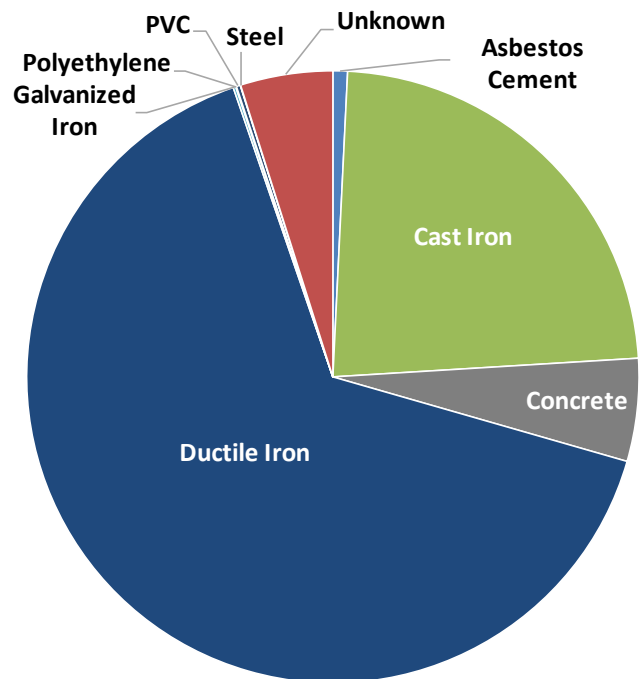


Water main in the City's system is constructed of asbestos cement, cast iron, concrete, ductile iron, galvanized iron, polyethylene, polyvinyl chloride (PVC), and steel piping, with approximately 65 percent of the system constructed of ductile iron pipe. Approximately 5 percent of the water main in the system is constructed of unknown material. All new water main installations are required to use Class 52 ductile iron pipe in accordance with the City's Standards for Water System Improvements. [Table 2-5](#) shows the City's existing water main inventory by material.

In response to the Governor's Directive 16-06 on lead, the City performed an assessment in 2016 to identify if any lead service lines or lead service components exist in the water system. The assessment found no lead service lines or lead service components present in the system.

Table 2-5
Water Main Material Inventory

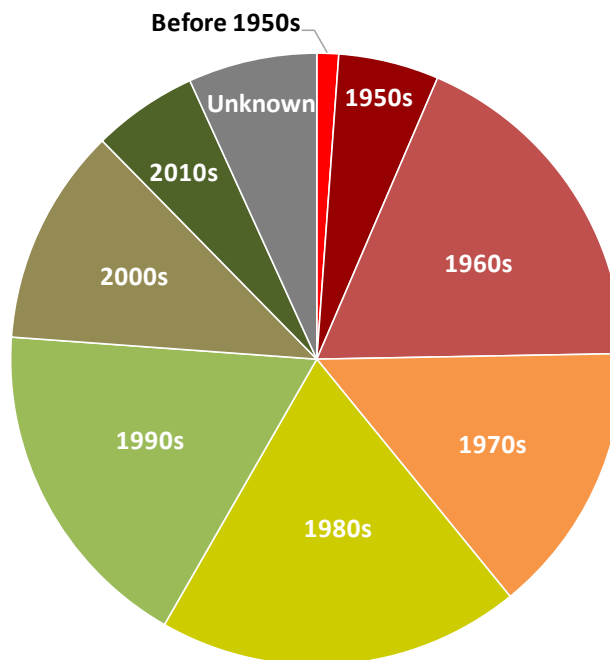
Material	Length (Feet)	% of Total
Asbestos Cement	11,544	0.8%
Cast Iron	348,899	23.3%
Concrete	81,416	5.4%
Ductile Iron	979,169	65.3%
Galvanized Iron	2,041	0.1%
Polyethylene	585	0.0%
PVC	3,113	0.2%
Steel	310	0.0%
Unknown	73,131	4.9%
Total	1,500,208	100%



Per industry standard, the life expectancy of water main is generally 50 to 75 years, depending on a variety of piping, water quality, and soil conditions. Approximately 39 percent of the water main within the City's system was constructed in the 1970s or before and is reaching or has reached its projected life expectancy. The remainder of the water main in the City's water system (discounting water main of unknown installation year), was constructed in the 1980s or later and is generally in good condition. A detailed breakdown of the City's water main installation inventory per year is shown in [Table 2-6](#).

Table 2-6
Water Main Installation Year Inventory

Year Installed	Length (Feet)	% of Total
Before 1950s	17,225	1.1%
1950s	79,590	5.3%
1960s	273,899	18.3%
1970s	216,196	14.4%
1980s	287,572	19.2%
1990s	267,942	17.9%
2000s	172,410	11.5%
2010s	83,322	5.6%
Unknown	102,052	6.8%
Total	1,500,208	100%



Transmission Main

Clark Springs Transmission Main

Water supply from Clark Springs is delivered to the City through the CSTM, which is composed of 18-inch to 24-inch-diameter pipes. Water from the Armstrong Springs Wells and the Seven Oaks Well can also be delivered to the City through the CSTM. Much of the alignment is routed along SE Kent-Kangley Road. The CSTM is approximately 12 miles long and terminates at the 6 MG #1 Reservoir.

Kent Springs Transmission Main

The KSTM delivers water to the City from Kent Springs and RWSS POD #1 through a 24- to 36-inch supply line that is approximately 11 miles long. The KSTM and CSTM are parallel for part of their alignments. Water from the Armstrong Springs Wells and the Seven Oaks Well also can be delivered to the City through the KSTM. The KSTM terminates at the Guiberson Reservoir. The KSTM was originally constructed from wood and concrete pipe. A ductile iron replacement project was completed in 1997.

The CSTM has an 18-inch intertie with the KSTM at Kent Springs, a 12-inch intertie with the KSTM at the Armstrong Springs Wells, and 16-inch intertie with the KSTM at the intersection of 132nd Avenue SE and SE Kent-Kangley Road.

6 MG #1 Reservoir to 6 MG #2 Reservoir Transmission Main

Between the 6 MG #1 Reservoir and 6 MG #2 Reservoir there are approximately 1.7 miles of 16-inch transmission main. There are a limited number of service connections on this transmission main. The City plans to connect these customers to smaller-diameter distribution system piping as it is constructed in this area.

PRESSURE REDUCING, PRESSURE SUSTAINING, AND FLOW CONTROL STATIONS

Pressure reducing stations are connections between adjacent pressure zones that allow water to flow from the higher pressure zone to the lower pressure zone while reducing the pressure of the water to maintain a safe range of operating pressures in the lower zone. A pressure reducing station typically consists of a below-grade vault (typically concrete) that normally contains two PRVs, sometimes a pressure relief valve, piping, and other appurtenances. The PRV hydraulically varies the flow rate through the valve (up to the flow capacity of the valve) to maintain a constant set pressure on the downstream side of the valve for water flowing into the lower pressure zone.

Pressure reducing stations can serve multiple purposes. First, they can function as an active supply facility by maintaining a continuous supply of water into a lower zone that has no other source of supply. The pressure reducing stations that serve the 368 Weiland Zone, 366 Stetson Zone, 339 Seattle Zone, 308 Hilltop Zone, and 271 Alvord Zone are this type. Pressure reducing stations also can function as standby supply facilities that are normally inactive (no water flowing through them). The operation of this type of station is typically triggered by a decrease in water pressure on the downstream side of the station. A typical application of this function is a station that is needed to supply additional water to a lower zone during a fire flow situation only. The pressure setting of the control valve within the station allows it to remain closed during normal system operation and open only during high-demand conditions, like fire flows, to provide the additional supply needed.

Pressure sustaining stations are connections between adjacent pressure zones that allow water to flow from the higher pressure zone to the lower pressure zone, provided the pressure in the higher zone remains above a certain threshold. The City does not have any pressure sustaining stations.

Flow control stations allow water to flow from a higher pressure zone to a lower pressure zone at a regulated flow rate. The City has flow control stations at the Tacoma interties, but the valves are currently fully open.

The City's water system has a total of 18 pressure reducing stations, as shown in plan view in [Figure 2-1](#) and in profile view on [Figure 2-2](#). A list of all pressure reducing stations and related data is contained in [Table 2-7](#).

Table 2-7
Pressure Reducing Valve Station Summary

Station Name	Upper Pressure Zone	Lower Pressure Zone
218th St PRV	416 Zone	240 Zone
42nd Ave PRV	587 Zone	529 Zone
Pump Station #5 PRV	590 Zone	485 Zone
Alvord PRV	485 Zone	271 Alvord Zone
Hilltop PRV	485 Zone	308 Hilltop Zone
Seattle PRV	485 Zone	339 Seattle
Stetson PRV	485 Zone	366 Stetson Zone
Totem PRV	575 Zone	529 Zone
Weiland PRV	485 Zone	368 Weiland Zone
Woodland Way PRV	590 Zone	485 Zone
234th PRV	590 Zone	485 Zone
Park Orchard PRV	Future 640 Zone	590 Zone
Daniel PRV	Future 640 Zone	590 Zone
Millineum PRV	Future 640 Zone	590 Zone
Pump Station #4 PRV	529 Zone	354.5 Zone
RWSS POD #1 Kent Springs Tacoma Connection PRV	Tacoma RWSS	529 Zone
RWSS POD #3 KSTM Tacoma Connection PRV	Tacoma RWSS	240 Zone
RWSS POD #3 590 Tacoma Connection PRV	Tacoma RWSS	590 Zone

WATER SYSTEM OPERATION AND CONTROL/TELEMETRY AND SUPERVISORY CONTROL SYSTEM

Successful operation of any municipal water system requires gathering and using accurate water system information. A telemetry and supervisory control system gathers information and can efficiently control a system by automatically optimizing facility operations. A telemetry and supervisory control system also provides instant alarm notification to operations personnel in the event of equipment failures, operational problems, fire, or other emergency situations.

The water system has a Headquarters telemetry control panel at the Public Works Building at 5821 South 240th Street. System facilities, including source, storage, and pumping, can be

controlled with the telemetry system. Repeaters are located on the East Hill and West Hill. Detailed, facility specific telemetry capabilities are included in [Chapter 8](#).

WATER SYSTEM INTERTIES

Water system interties are physical connections between two adjacent water systems. Interties are normally separated by a closed isolation valve or control valve. Emergency supply interties provide water from one system to another during emergency situations only. An emergency situation may occur when a water system loses its main source of supply or a major transmission main, or during firefighting situations, and is unable to provide a sufficient quantity of water to its customers. Normal supply interties provide water from one system to another during non-emergency situations and are typically supplying water at all times. Interties between the City and adjacent purveyors are shown on [Figure 2-4](#).

Emergency Supply Interties

City of Auburn

The intertie between Auburn and the City, located near the intersection of 78th Avenue S and S 277th Street, has been active since 1991. Emergency two-way supply is provided through a 6-inch meter. The intertie capacity is 0.3 MGD and connects Auburn's 242 Pressure Zone with the City's 240 Zone. A copy of the intertie agreement is included in [Appendix B](#).

City of Renton

The City's intertie with Renton, active since 1980, has a capacity of 2.6 MGD. Emergency two-way supply is provided through a 10-inch meter. The intertie is located near the intersection of S 180th Street and Lind Avenue SW. The intertie connects Renton's 196 Pressure Zone and the City's 240 Zone. A copy of the intertie agreement is included in [Appendix B](#).

City of Tukwila

The City's intertie with Tukwila has been active since 1979 and provides a capacity of 3.4 MGD for emergency two-way supply and peak demands. A 10-inch meter connects Tukwila's 368 Pressure Zone with the City's 240 Zone. The intertie is located near the intersection of South Todd Boulevard and 68th Avenue South.

Highline Water District

The City's intertie with HWD has been active since 1995. The intertie is located near S 240th Street and I-5. The intertie's purpose is emergency two-way supply, fire flow, and supply during maintenance. A capacity of 1.5 MGD can be provided through an 8-inch meter. Water can be provided from HWD's 560 Pressure Zone to the City's 587 Zone via Pump Station #8. A copy of the intertie agreement and the 2018 long-term franchise agreement between the City and HWD are included in [Appendix B](#). The 2018 long-term franchise agreement identifies the Retail Water Service Area (RWSA) boundary between the two systems.

Soos Creek Water and Sewer District

The City's emergency intertie with Soos Creek Water and Sewer District (SCWSD) has been active since 2001. The intertie has a capacity of 1.0 MGD, providing water from SCWSD's 627 Pressure Zone to the City's 590 Zone. The intertie is located near the intersection of

113th Avenue SE and SE 227th Place. A copy of the intertie agreement is included in [Appendix B](#).

Lake Meridian Water District

Two 6-inch meters comprise the intertie with Lake Meridian Water District (LMWD), which has been active since 1962. The combined capacity of these meters is 2.0 MGD. The purpose of the intertie is emergency two-way supply, and provision of water to LMWD. The intertie connects LMWD's 590 Pressure Zone with the City's 590 Zone. The north meter is located on SE 256th Street west of 124th Avenue SE. The south meter is located near the intersection of SE 282nd Street and 124th Avenue SE.

Permanent Supply Interties

City of Tacoma

The City's permanent supply interties with Tacoma is described in the [Supply Facilities](#) section of this chapter.

WATER SERVICE AGREEMENTS

WATER SERVICE AREA AGREEMENT

The City's retail water service area is based on the 1989 CWSP. The current retail water service area agreement is included as [Appendix B](#).

SOUTH KING COUNTY REGIONAL WATER ASSOCIATION JOINT OPERATING AGREEMENT

In January 1995, the City signed a Joint Operating Agreement (JOA) with Auburn, City of Black Diamond, CWD, and LMWD. The intent of the JOA signatories was to cooperatively provide the additional facilities needed to develop a South King County Subregional Water Supply System. The JOA is included in [Appendix B](#).

SECOND SUPPLY PROJECT PARTNERSHIP AGREEMENT

In 1933, Tacoma established a priority date for its second water right diversion from the Green River. In 1963, Tacoma initiated efforts to develop what was referred to as Pipeline-5 and is now called the Second Supply Pipeline project. In 1985, the City contracted with Tacoma Public Utilities (TPU) to purchase 7.2 MGD of summer peaking water from the proposed RWSS project.

In 1995, TPU, Seattle Public Utilities (SPU) and its purveyors, and the South King County utilities of the City, CWD, LWSD, and LMWD, began nearly 5 years of discussions and negotiations regarding the framework, conditions, and costs of project participation. Significant changes to the contractual framework of the project, including the withdrawal of LMWD, occurred in the early stages of the project, and a complex and highly technical multi-party negotiation ensued.

In October, 2002, a final agreement was reached with TPU, the City, LWSD, and CWD. The agreement and all amendments are included in [Appendix B](#). In the course of that final agreement, the City's share of the RWSS was increased to 12.64 MGD after SPU determined that it would no longer participate in the project. Water supply from the RWSS project became available to the City in 2007. The percent ownership of the RWSS project is detailed in [Table 2-8](#).

Table 2-8
Regional RWSS Percent Ownership

Utility Partner	Percent Ownership
Tacoma Public Utilities	41.67% (15/36ths)
City of Kent	19.44% (7/36ths)
Covington Water District	19.44% (7/36ths)
Lakehaven Water and Sewer District	19.44% (7/36ths)

The RWSS source of supply is considered critical to the City's ability to meet short- and long-term demand needs. In this regard, the City has expended substantial financial resources on the RWSS project in reliance on the Ecology-approved water right and place of use documents issued to Tacoma, and the executed contracts.

In addition to the RWSS Partnership Agreement, Water Supply Agreements were signed by RWSS project participants. These Water Supply Agreements are included in [Appendix B](#).

SATELLITE SYSTEM MANAGEMENT

A Satellite System Management Agency (SSMA) is defined as a person or entity that is certified by DOH to own or operate more than one public water system without the necessity for a physical connection between such systems. SSMA's were created to stop the proliferation of small water systems, many of which could not meet federal and state water quality and water system planning regulations. The goal of SSMA's is to ensure that the people of Washington State will receive safe and reliable water supplies in the future from professionally managed or properly operated water systems. SSMA's can provide three different levels of service:

1. Ownership of the satellite system;
2. Operations and management of the satellite system; or
3. Contract services only.

The service can be provided to new systems, existing systems that are no longer viable, or existing systems placed into receivership status by DOH.

The City is responsible for providing water service to all customers in the City's water service area defined in the CWSP. Much of the area surrounding the City's service area is currently being served by large, stable water systems that are unlikely to be future satellite water systems operated by the City.

The City is not a certified SSMA and has no plans to assume such responsibility. The City does provide limited technical assistance, specifically water quality testing, to one small system in the Clark Springs watershed, the Ravensdale Mobile Home Park.

ADJACENT WATER SYSTEMS

Numerous water systems are adjacent or close to the City's water service area. **Figure 2-3** shows the regional water supply setting, including the City's and other purveyor service areas.

Table 2-9 lists details of all purveyors shown on **Figure 2-3**.

**Table 2-9
Adjacent Systems**

Water System Name	Approximate Location in Relation to the City's Retail Water Service Area	Approximate Number of Service Connections	Source of Supply
Cedar River Water and Sewer District	Northeast	10,026	4 interties, 1 groundwater well
City of Auburn	South	24,132	2 groundwater springs, 11 groundwater wells, 5 interties
City of Renton	North	17,400	1 groundwater spring, 13 groundwater wells, 4 intertie
City of Tukwila	North	4,036	5 interties
Covington Water District	East	18,500	12 groundwater wells, 8 interties
Highline Water District	West	27,870	5 groundwater wells, 5 interties
Lake Meridian Water District	East	5,269	7 groundwater wells, 8 interties
King County Water District 125	Northwest	6,746	5 interties
King County Water District 49	Northwest	6,902	4 interties
Lakehaven Water and Sewer District	Southwest	45,792	25 groundwater wells, 3 interties
Seattle Public Utilities	Northwest	173,833	1 intertie, 4 groundwater wells, 2 surface water source
Soos Creek Water and Sewer District	East	22,898	1 intertie

Eight major adjacent purveyors, which include Auburn, Renton, Tukwila, CWD, HWD, LWSD, SCWSD, and LMWD are described below in additional detail.

CITY OF AUBURN

Auburn's water service area is located to the south of the City. Auburn provides water to approximately 24,132 service connections. An intertie between the two water systems provides emergency two-way supply. Auburn is within the South King County Critical Water Supply Service Area, and thus is subject to the South King County CWSP.

CITY OF RENTON

Renton's water service area is located to the northeast of the City's water service area and includes a small area of the City of Kent. Renton provides water to approximately 17,400 service connections. An intertie between the two water systems provides emergency two-way supply. Renton is within the East King County Critical Water Supply Service Area, and thus is subject to the East King County CWSP.

CITY OF TUKWILA

Tukwila's water service area is located to the north of the City's water service area. Tukwila provides water to approximately 4,036 service connections. An intertie between the two cities provides water for emergency two-way supply and peak demands.

COVINGTON WATER DISTRICT

CWD is located to the east of the City's water service area, and surrounds the Kent Springs, Clark Springs, and Armstrong Springs Wells sources. While these sources and portions of the CSTM and KSTM are located in CWD's water service area, the two water service areas are not immediately adjacent. CWD provides water to approximately 18,500 service connections. CWD is a member of the Tacoma RWSS. CWD is located within the South King County Critical Water Supply Service Area; thus, it is subject to the South King County CWSP.

HIGHLINE WATER DISTRICT

HWD is located to the west of the City's water service area and provides water service to part of the Kent City limits on the West Hill. HWD provides water service to approximately 27,870 service connections and has an intertie with the City at Pump Station #8. The City executed an interlocal agreement in 2005 with HWD to adjust water service areas in the vicinity of the Kentview Development. A Long-Term Franchise Agreement was executed by the City and HWD in 2018. A copy is included in [Appendix B](#). HWD is located within the South King County Critical Water Supply Service Area and is subject to the South King County CWSP.

LAKEHAVEN WATER AND SEWER DISTRICT

LWSD is located to the southwest of the City's water service area. Although boundaries are close, the City's and LWSD's water service areas are not immediately adjacent. LWSD provides water service to approximately 45,792 service connections.

SOOS CREEK WATER AND SEWER DISTRICT

SCWSD is located to the east of the City's water service area and provides water service to a significant portion of the City, around Panther Lake. SCWSD has approximately 22,898 service connections, and an intertie with the City. SCWSD is located within the East King County Critical Water Supply Area, and thus is subject to the East King County CWSP.

LAKE MERIDIAN WATER DISTRICT

LMWD is located to the east of the City's water service area and provides water service to a significant portion of the City, around Lake Meridian. LMWD provides water service to approximately 5,269 service connections and has two interties with the City. LMWD is located within the South King County Critical Water Supply Service Area; thus, it is subject to the South King County CWSP.